



# Value of Municipal Water Conservation

Michael Brent, Cascade Water Alliance

December 14, 2018

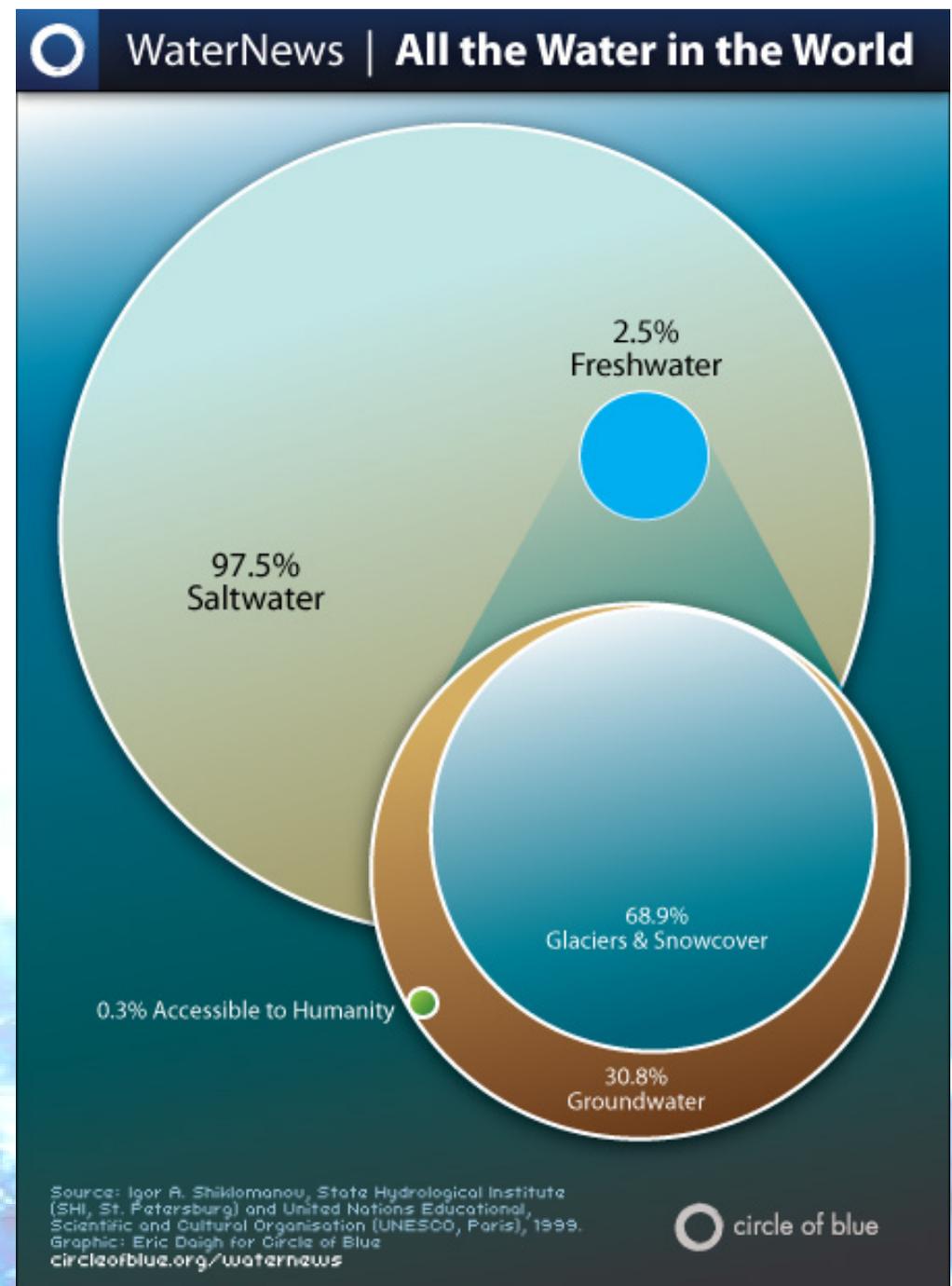
# Cascade Water Alliance

- Municipal water provider formed in 1999 for seven cities and water districts in suburban King County
- Serve 400,000 residents and 20,000 businesses
- Supply water through purchases from Seattle Public Utilities and member groundwater supplies
- Own and operate Lake Tapps; White River Project
- Provide planning, contracting, and water conservation programs

# Cascade Water Alliance

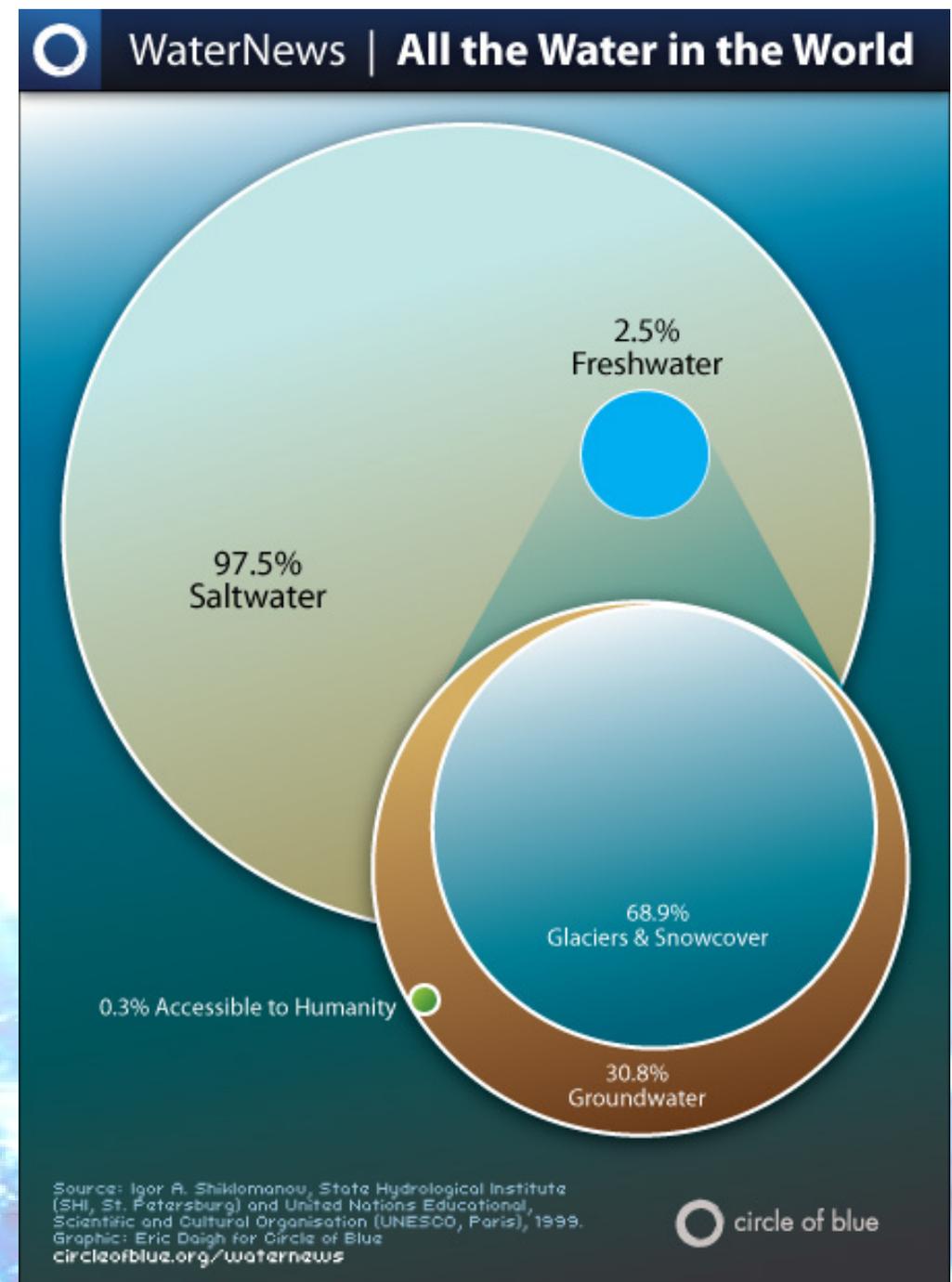
- Active water conservation program since 2004
- Measures addressing
  - Replacement of old showerheads | toilets | clothes washers
  - Landscape irrigation systems (sprinklers)
  - Education and outreach
  - Training
- Recognized by AWWA and US EPA
  - WaterSense Partner of the Year (2010 and 2016)

# How much freshwater?

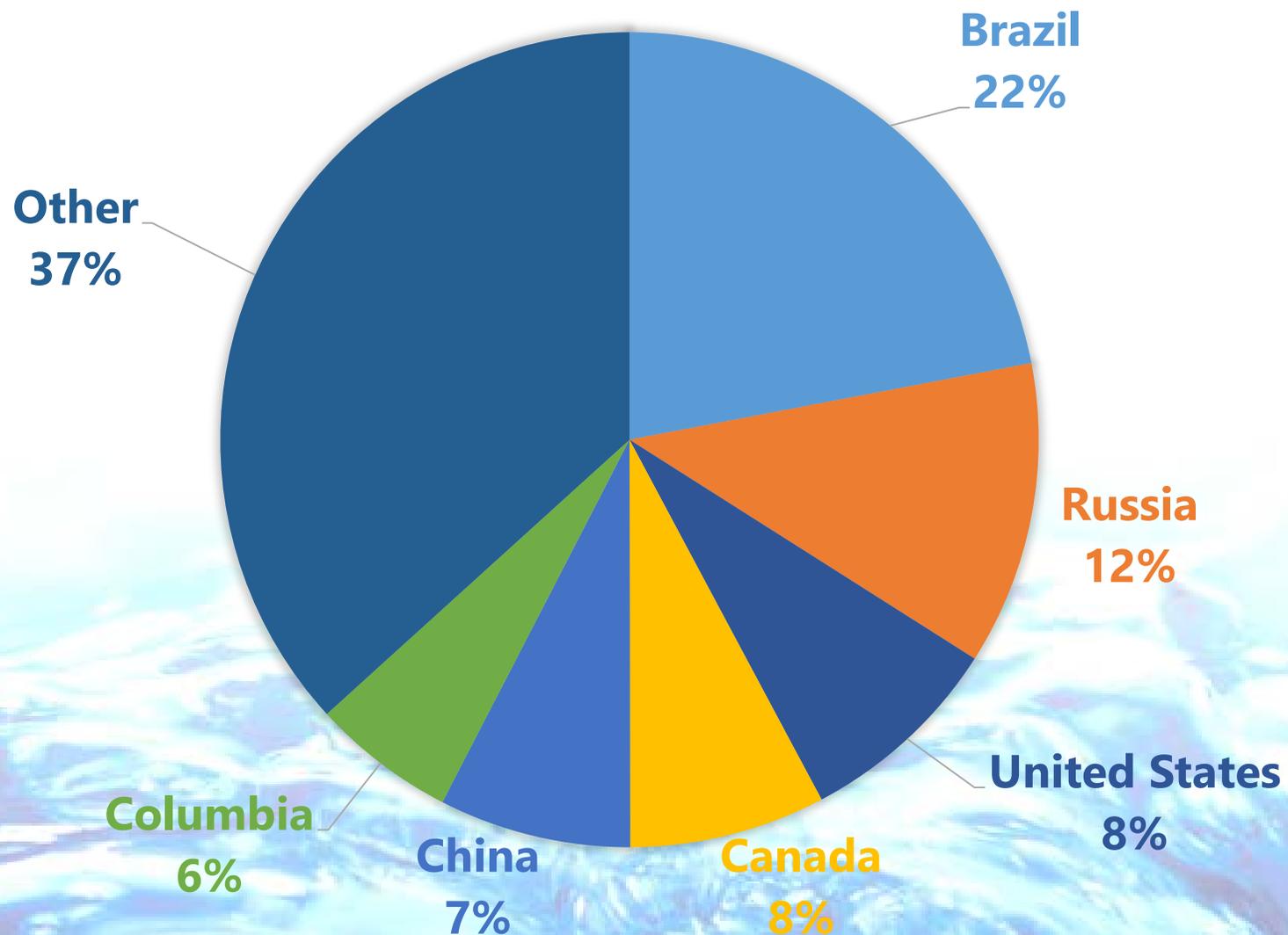


# How much freshwater?

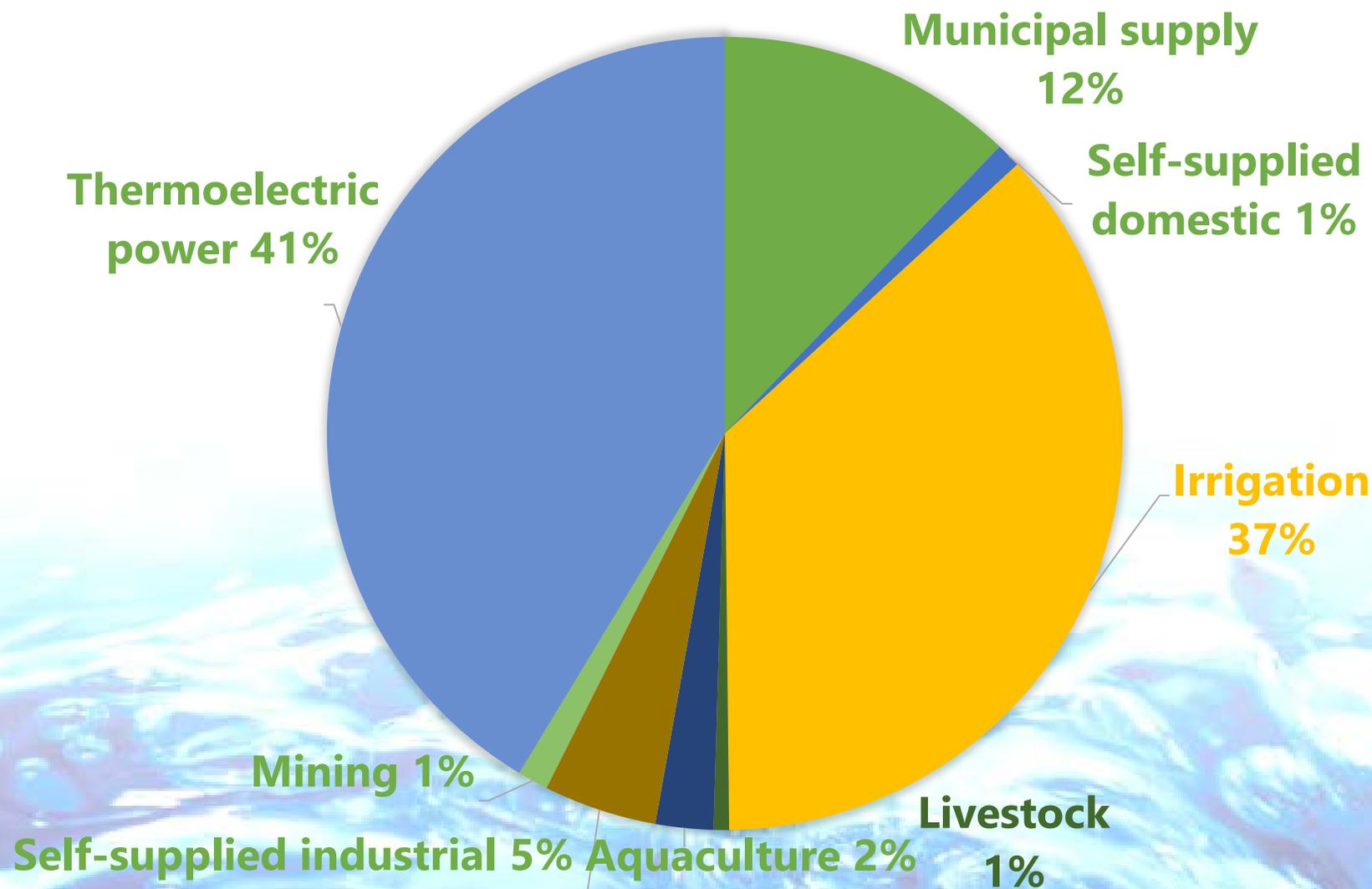
**0.3% of earth's water for 7.6 billion people**



# Where is the freshwater?



# How is freshwater used in the US?



# Residential indoor water use

							
Toilet <b>24%</b> 33.1 gphd	Shower <b>20%</b> 28.1 gphd	Faucet <b>19%</b> 26.3 gphd	Clothes washer <b>17%</b> 22.7 gphd	Leak <b>12%</b> 17.0 gphd	Other* <b>4%</b> 5.3 gphd	Bath <b>3%</b> 3.6 gphd	Dishwasher <b>1%</b> 1.6 gphd

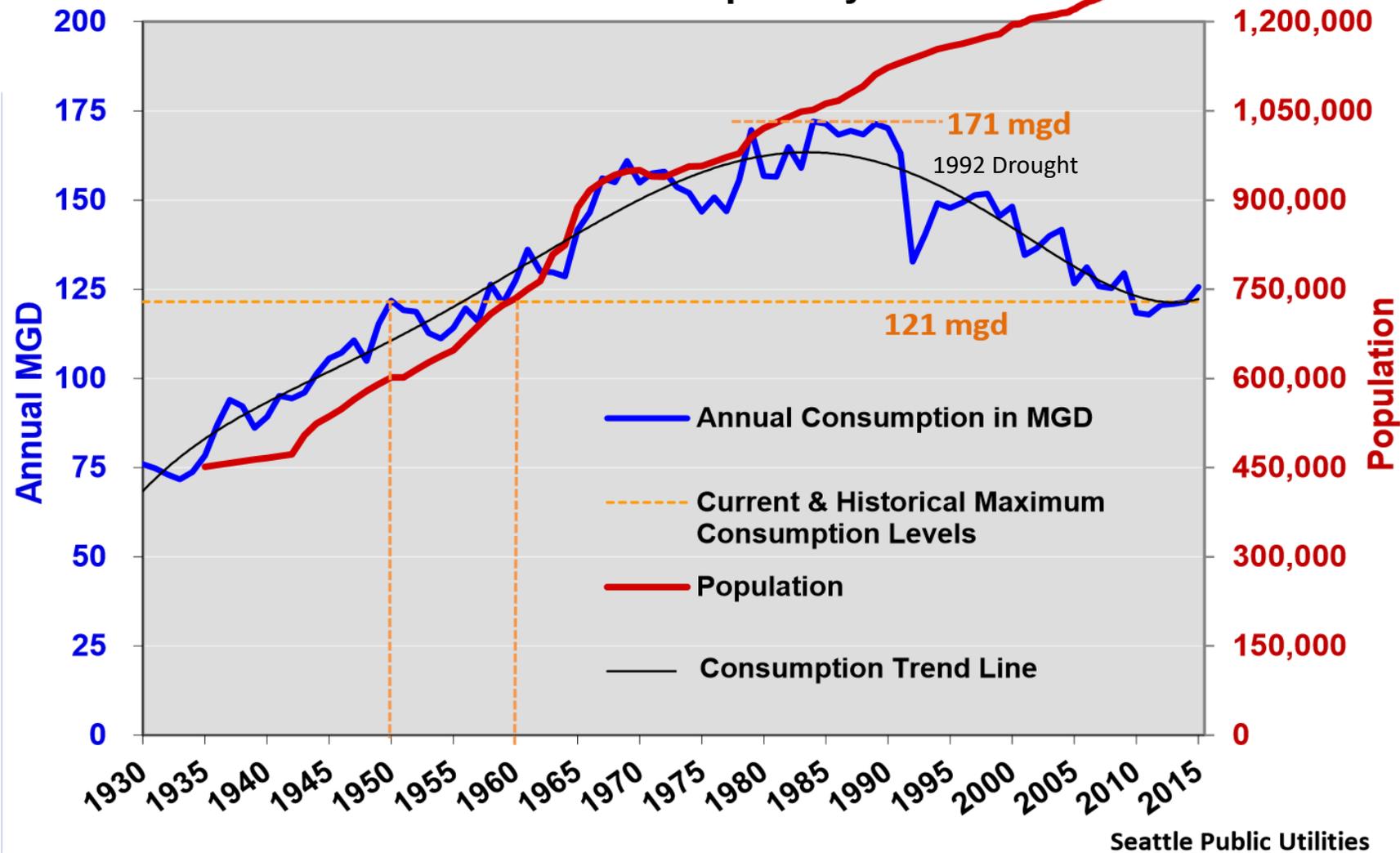
# Pop Quiz!

In the greater Seattle area, is municipal water use

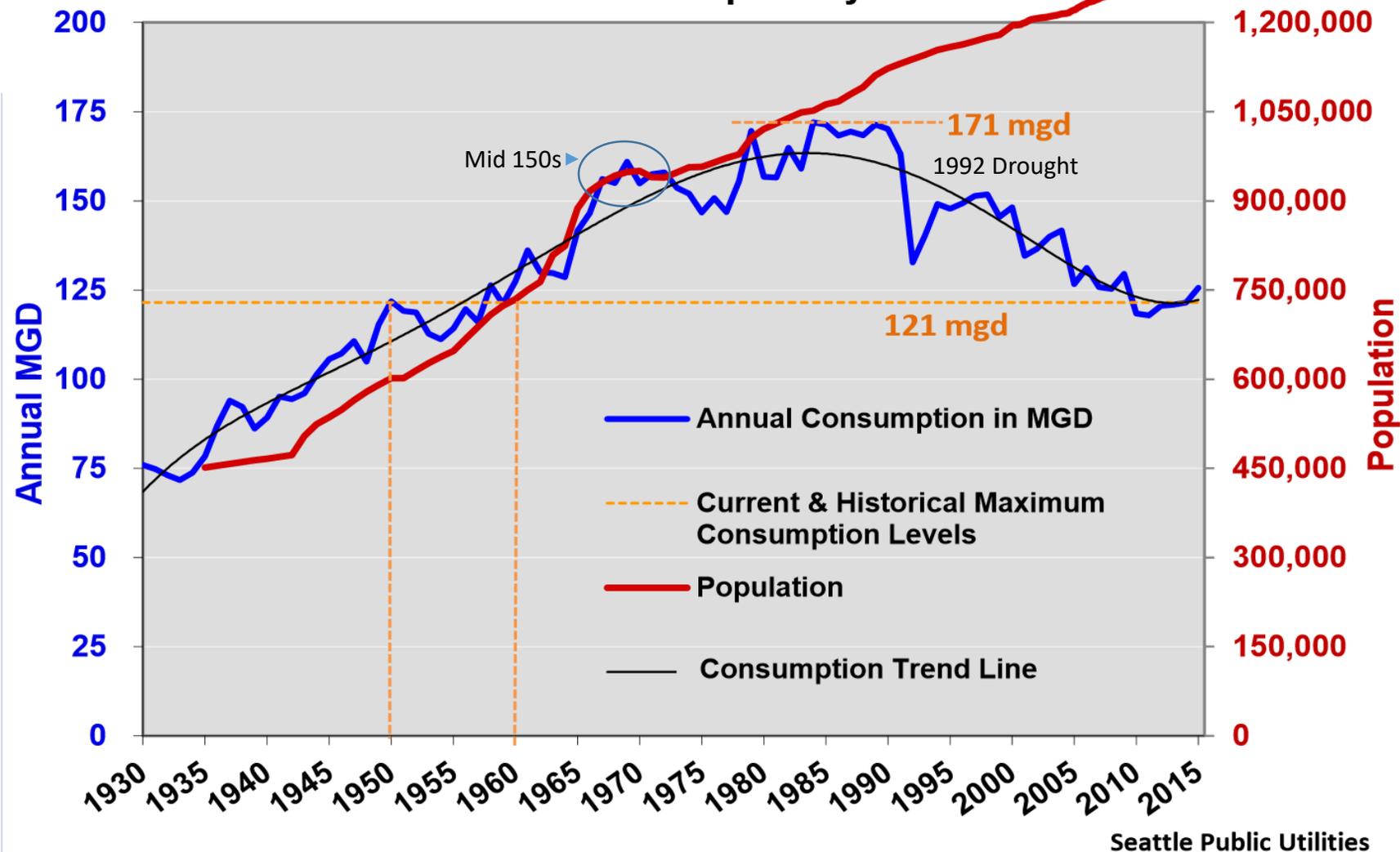
1. Greater than it was 50 years ago?
2. About the same as it was 50 years ago?
3. Less than it was 50 years ago?



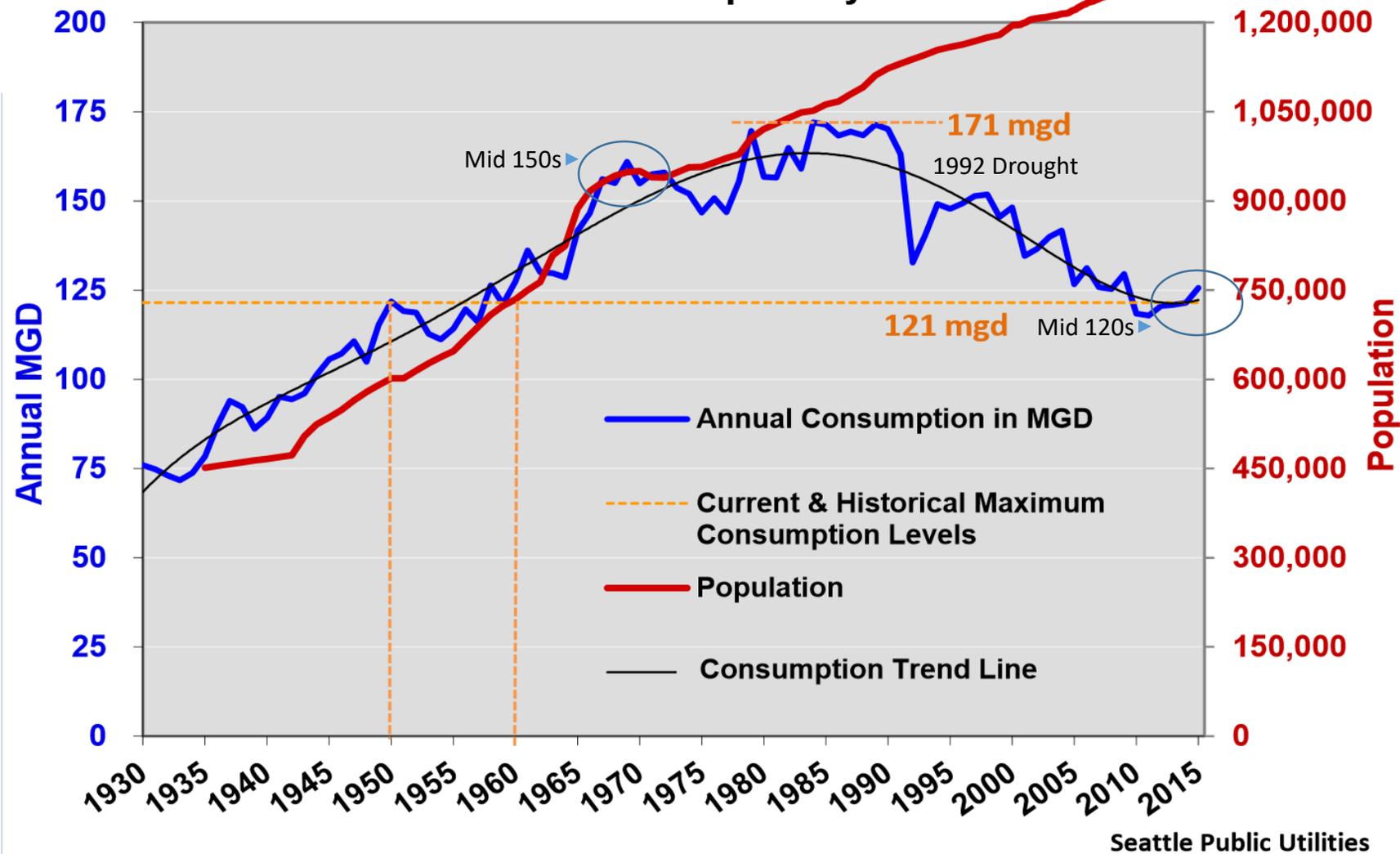
### Total Seattle Regional Water System Annual Demand in Millions of Gallons per Day: 1930-2015



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# Why is municipal water demand decreasing?



# Water use efficiency rule

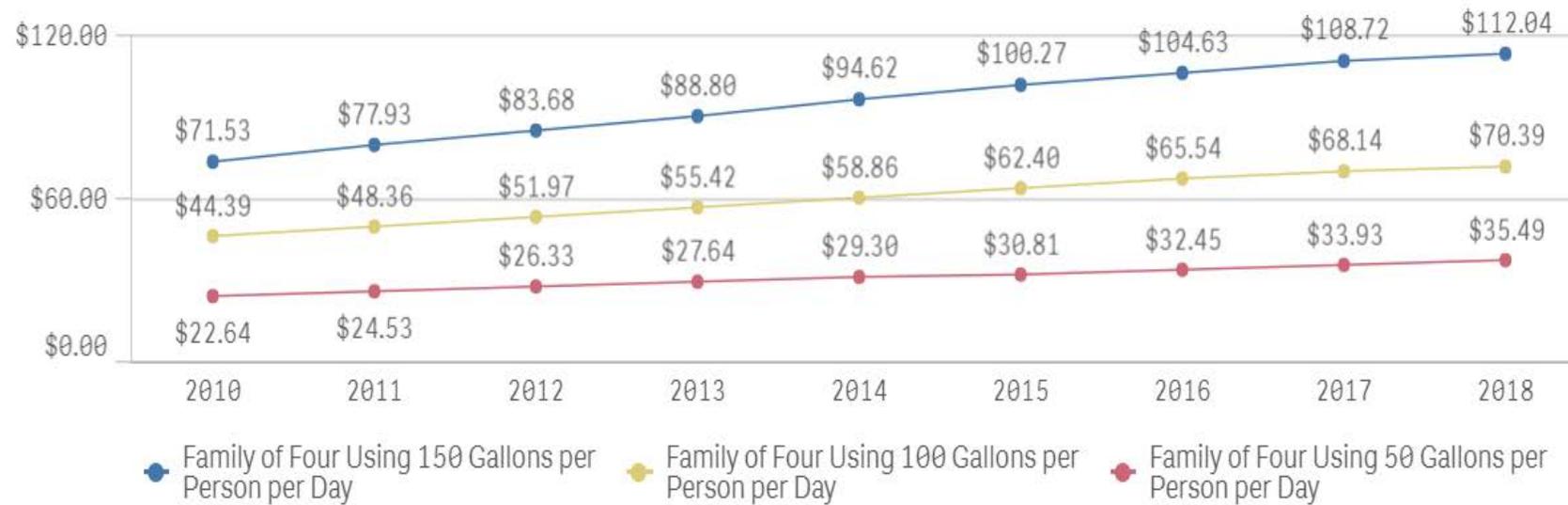
(2003 Municipal Water Law, RCW 90.03; WAC 246-290)

## Requirements for water providers

- Establish water savings goal
- Develop a WUE planning program to support the established goals
- Report annually on progress towards achieving these goals
- Install meters on all customer connections by January 22, 2017
- Achieve a standard of no more than 10% water loss

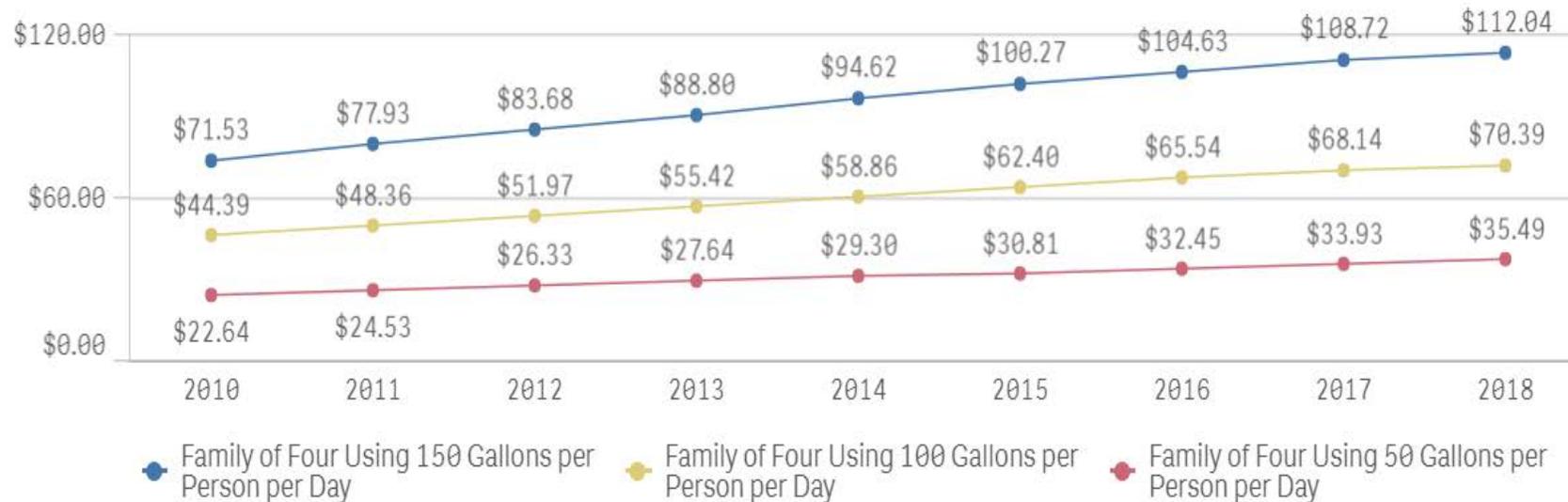
# Rising cost of water

Average Monthly Cost of Water



# Rising cost of water

Average Monthly Cost of Water



- Cost of water rising faster than the rate of inflation



2017  
INFRASTRUCTURE  
REPORT CARD



2017  
INFRASTRUCTURE  
REPORT CARD  
ASCE

# Drinking Water

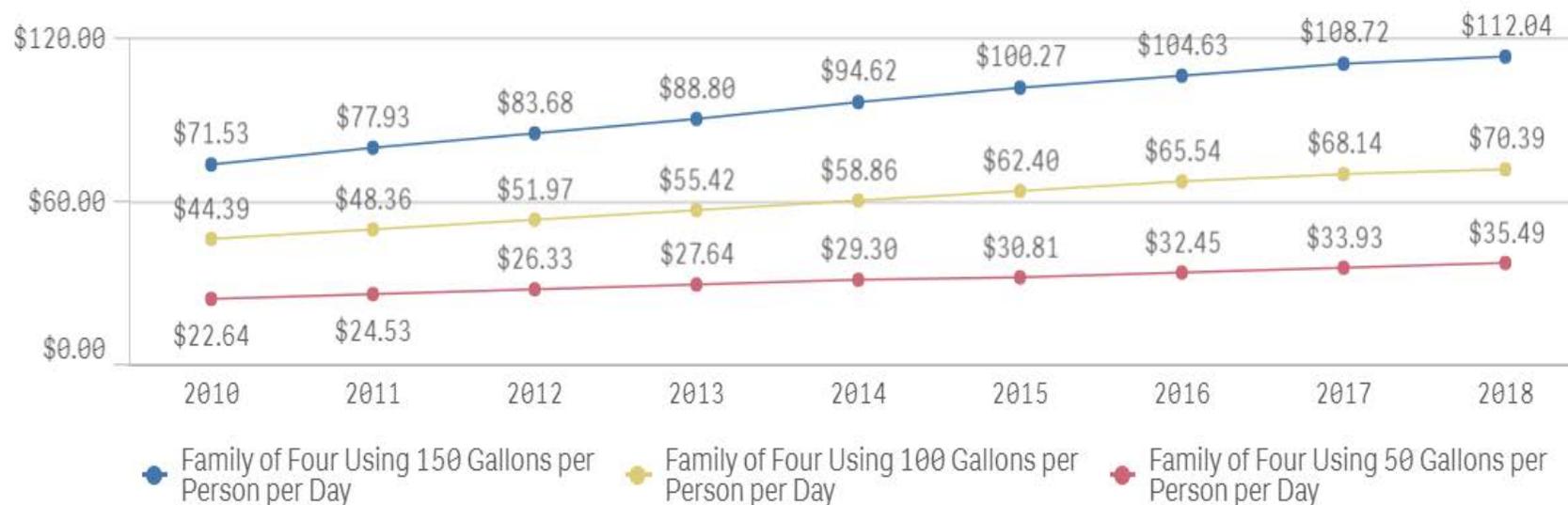
6 billion gallons of  
treated water lost every day

## OVERVIEW

Drinking water is delivered via one million miles of pipes across the country. Many of those pipes were laid in the early to mid-20<sup>th</sup> century with a lifespan of 75 to 100 years. The quality of drinking water in the

# Rising cost of water

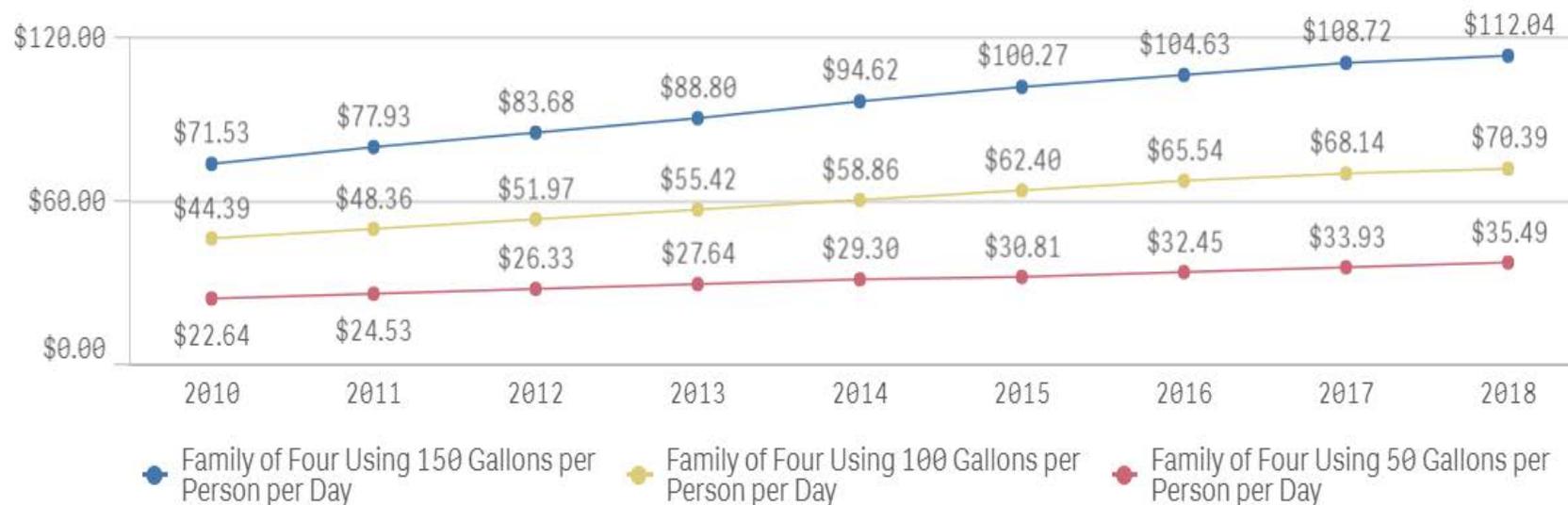
Average Monthly Cost of Water



- Cost of water rising faster than the rate of inflation
- Investment in water systems will drive rates higher

# Rising cost of water

Average Monthly Cost of Water



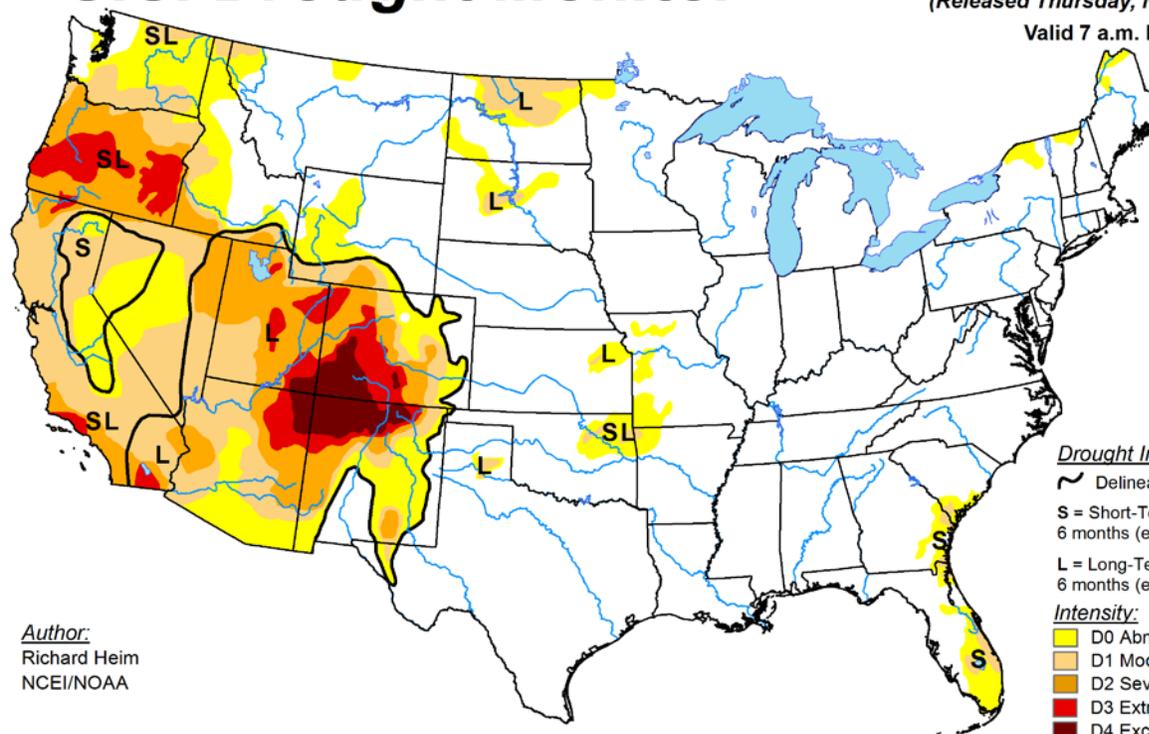
- Cost of water rising faster than the rate of inflation
- Investment in water systems will drive rates higher
- Water bills will consume a larger percentage of household budget

# Repeated droughts and limited water availability



## U.S. Drought Monitor

November 27, 2018  
 (Released Thursday, Nov. 29, 2018)  
 Valid 7 a.m. EST



**Drought Impact Types:**

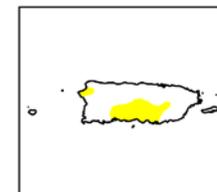
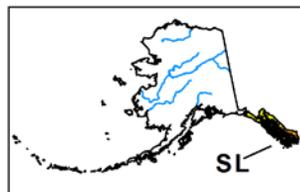
- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

**Intensity:**

- Yellow: D0 Abnormally Dry
- Light Orange: D1 Moderate Drought
- Orange: D2 Severe Drought
- Dark Orange: D3 Extreme Drought
- Dark Red: D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:  
 Richard Heim  
 NCEI/NOAA



<http://droughtmonitor.unl.edu/>

# Evolving customer attitudes

- Concern for Puget Sound and other water resources
- Greater interest in sustainability
- Save money on utility bills
- Climate change



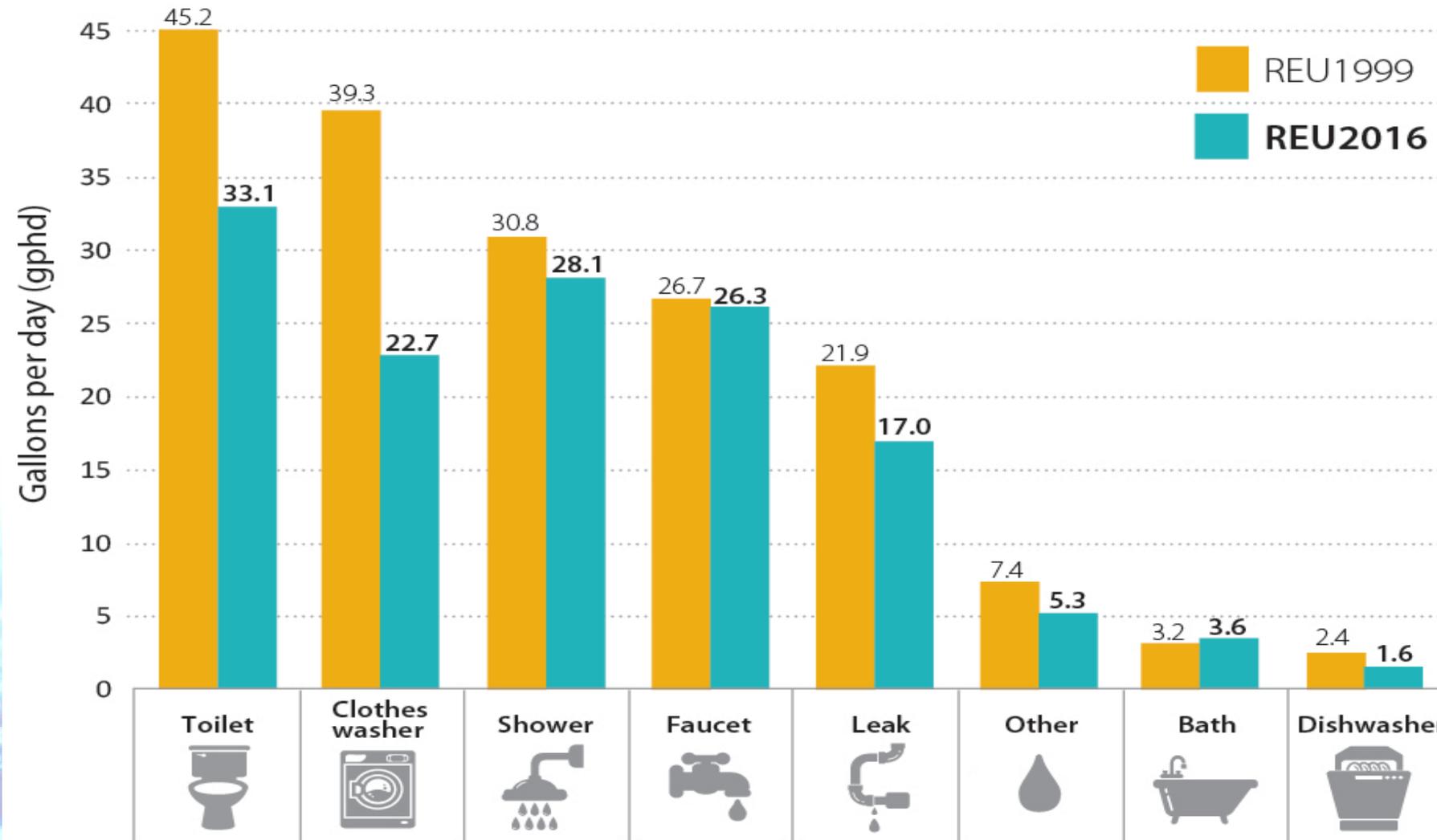
# Improved water efficiency standards

## Example: Toilets

- 1950s – 1980 5.0+ gpf
- 1980 – 1994 3.5 gpf
- 1994 – present 1.6 gpf
- Present – 1.28 or less gpf

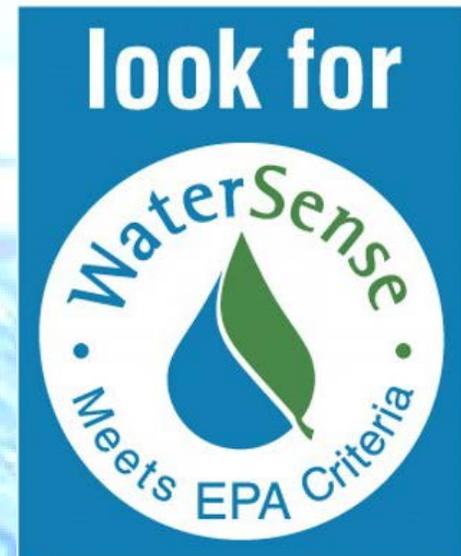


# Indoor water use (gallons per day per household)



# US EPA WaterSense program

- Voluntary labeling program for water-using fixtures
  - Toilets | Showerheads | Faucets | Sprinklers
  - New Homes
- Must be 20% more efficient than code or standard
- Includes performance component

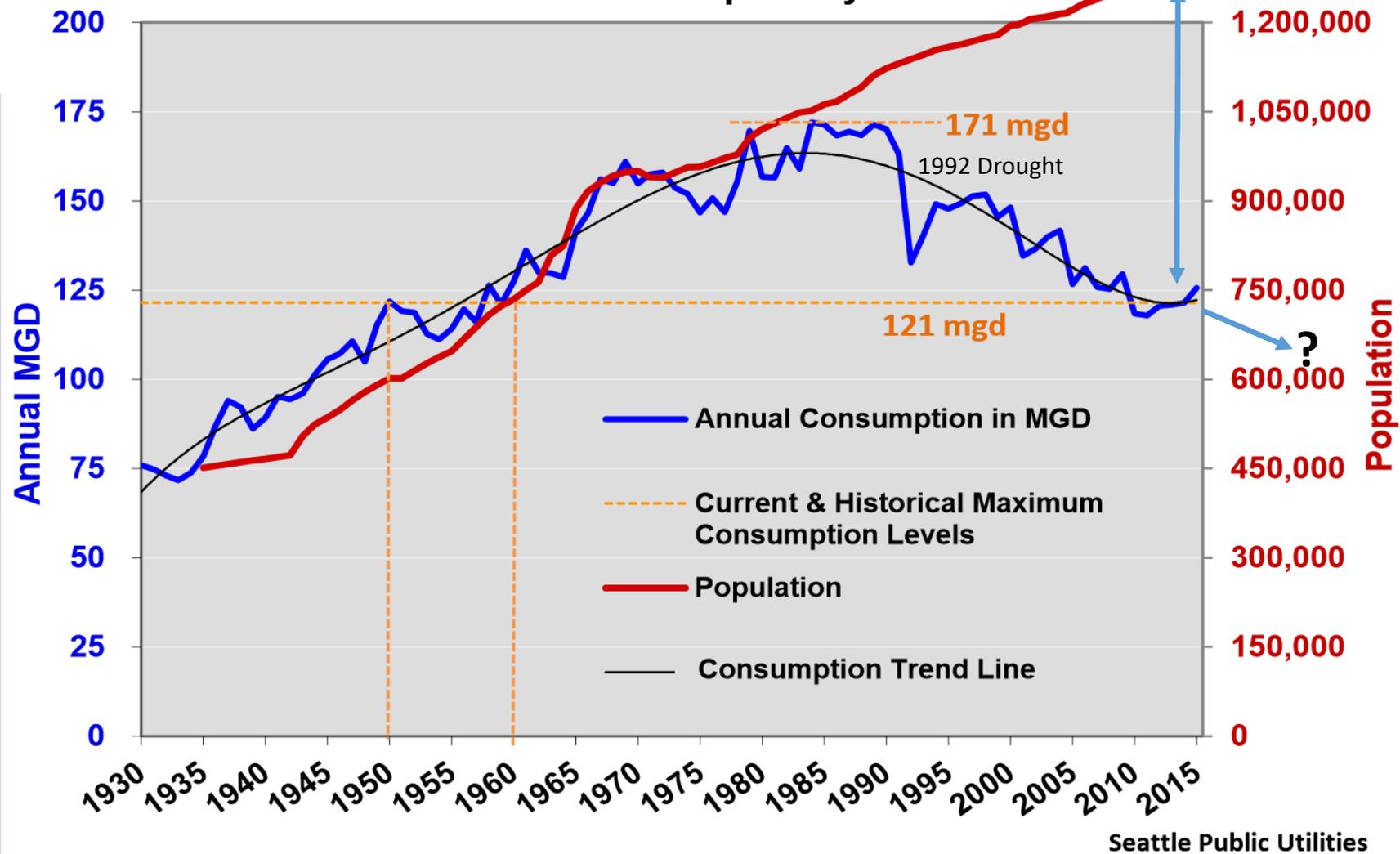


# Why is municipal water demand decreasing?

Water scarcity, economics, technology, and changing values have caused water providers and end users to embrace water conservation.



## Total Seattle Regional Water System Annual Demand in Millions of Gallons per Day: 1930-2015

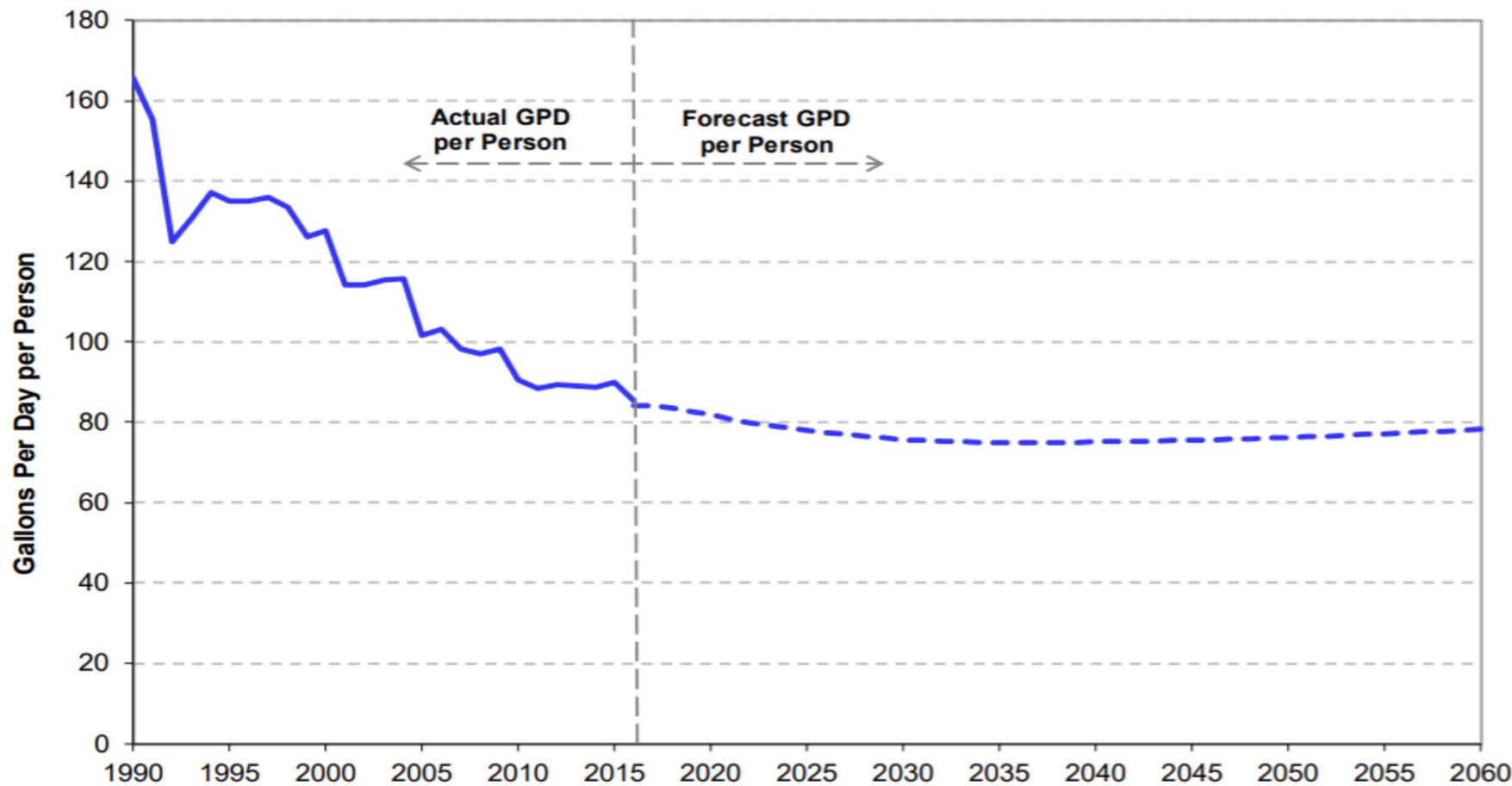


# How low can we go?



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**Actual & Forecast Water Consumption Per Capita:  
Saving Water Partnership Customers**



# zHome

- Condominium in the Issaquah Highlands
- Ultra sustainable homes, zero net energy use
- Goal: municipal water use of 29 gpd/pc
  - WaterSense labeled fixtures
  - Rainwater harvesting
  - Drought resistant landscaping



# zHome municipal water use

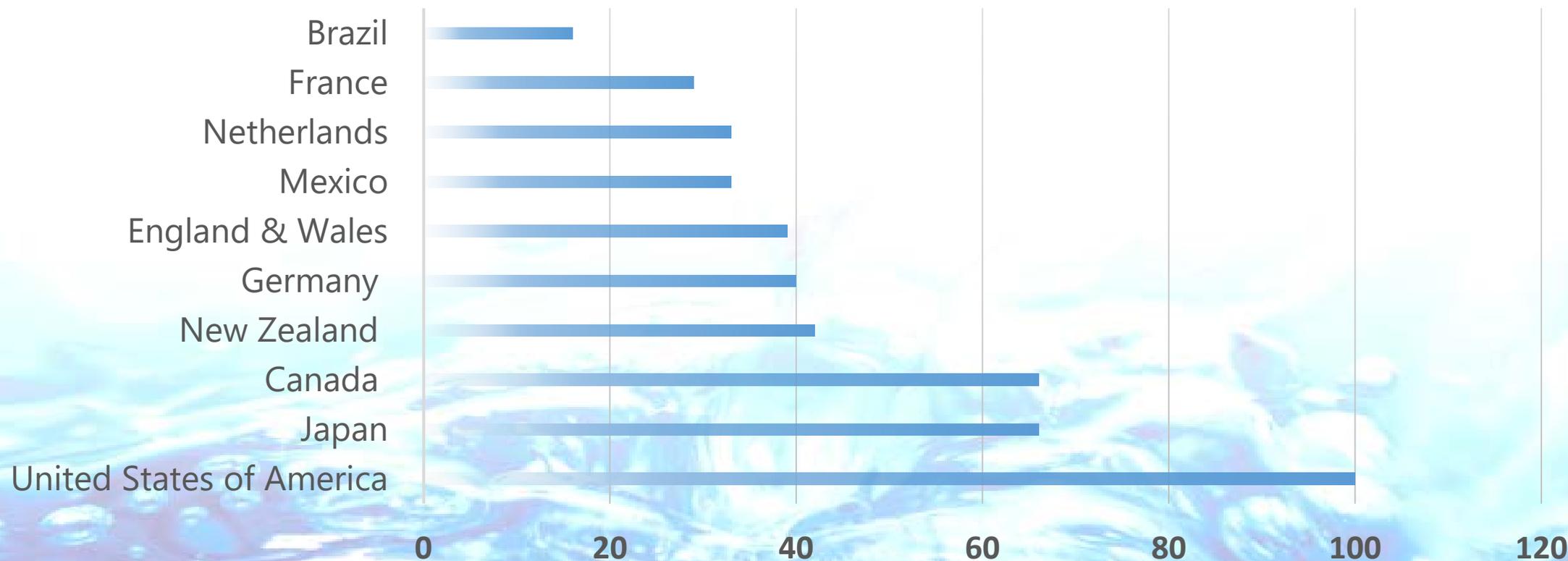
(gallons per person per day)

- 18 gallons vs. 50-100 gallons for traditional homes
- High customer satisfaction for water fixtures and appliances



# Water use in the developed world

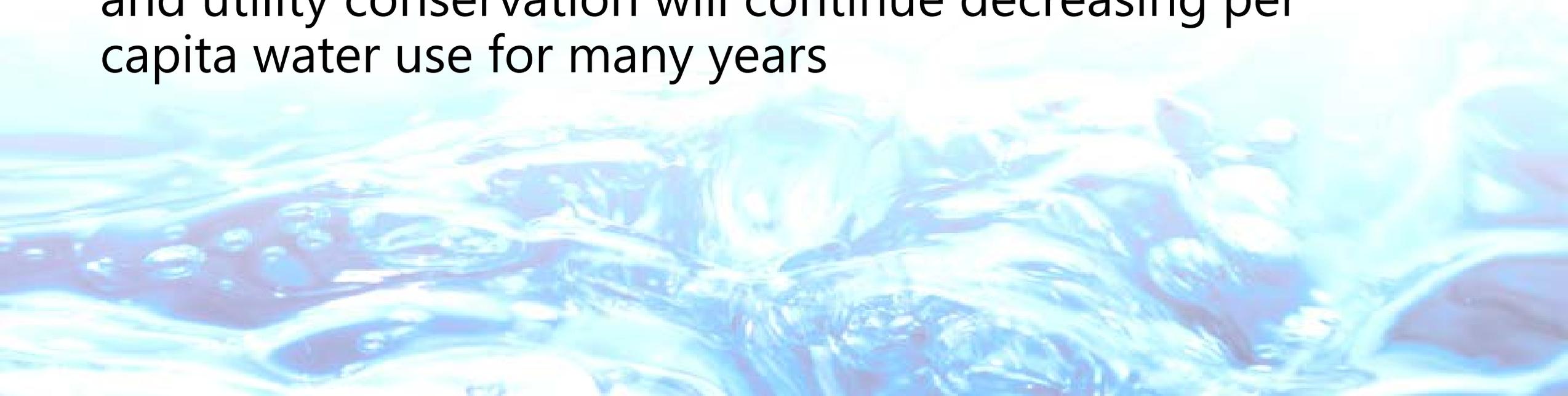
Per capita daily water use (gallons)



# How low can we go?

Per capita water use of 20 - 40 gallons per day is achievable

Water scarcity, economics, technology, public support, and utility conservation will continue decreasing per capita water use for many years

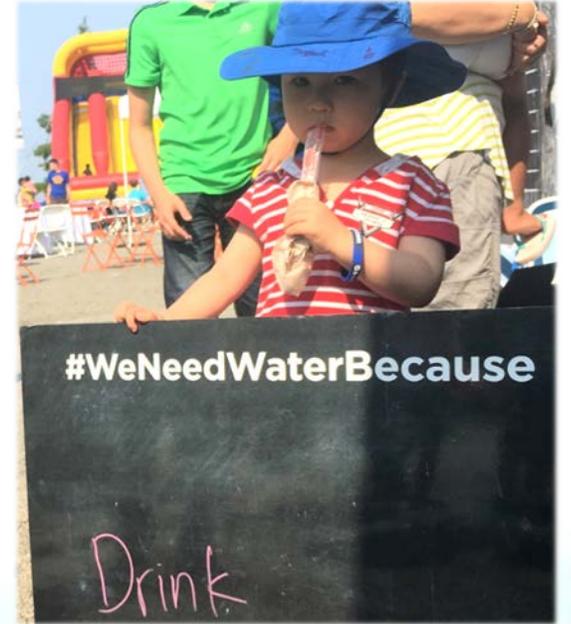


# Cascade's local impact strategy

Education + action = success



# Challenge people to consider the value of water



# School programs

- Watershed protection, salmon recovery, science of water, water poverty
- Reached 15,000 students in 2017
- Teachers develop water-based curricula
- Perform home water audits and retrofits, community projects

Pacific Cascade MS, Water Conservation Audit Summary Completed March 2017

			Potential Water Savings in gallons	Potential Energy Savings in kWh	Potential GHGe savings in lbs
<b>Students identified:</b>					
Non-efficient clothes washer	100		591,000	98,700	60,300
Non-efficient kitchen faucet	135		246,000	41,100	25,100
Non-efficient bathroom faucet	553		1,760,000	294,000	180,000
Non-efficient showerhead	308		1,040,000	174,000	106,000
Non-efficient toilet	504		1,820,000	4,730	4,260
Non-efficient dishwasher	119		65,300	10,900	6,660
Toilets with leaks	92		737,000	1,920	1,720
	<b>Total</b>		<b>6,259,300</b>	<b>625,350</b>	<b>384,040</b>



# Gardening classes and irrigation training

- Dozens of irrigation / gardening classes
- Established program at Lake Washington Institute of Technology



## SUSTAINABLE LANDSCAPES I

A new course in the Sustainable Landscape Technologies series offered through the Environmental Horticulture Department at Lake Washington Institute of Technology

Fridays, 2:00-5:00PM

2/17/17 - 3/17/17

- Five-week course designed to be accessible to working professionals. All materials and supplies provided. **No prerequisites are required.**
- Hands-on instruction on sustainable landscaping practices & principles, including:

# Bellevue School District

- Provided irrigation evaluations for 21 schools
- Analysis and recommendations
- Trained staff
- Savings of 5.3 million gallons; ~\$63,000 (2018 vs 2017)



Location: North side of NW Lee Leman Drive, across from NW Varese Court  
 Model: HiWeathermatic SL 1600  
 Seasonal Adjustment Setting: 100%  
 Program(s) Utilized: A, start time is 3:00 a.m. and 9:00 p.m., active days are M, T, W, Th, F

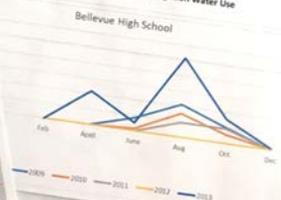
Zone	Plant Material	Run Time	Findings
1	Turf parking strip	12 minutes	Significant water loss, two broken sprinkler heads, multiple sprinkler heads are not clearing the turf, some leaning sprinkler heads, overspray, poor distribution uniformity
2	Turf parking strip	12 minutes	Significant water loss, one broken sprinkler head, multiple sprinkler heads are not clearing the turf, some leaning sprinkler heads, overspray, poor distribution uniformity
3	Turf parking strip	12 minutes	Significant water loss, multiple sprinkler heads are not clearing the turf, distribution uniformity
4	Turf parking strip	12 minutes	Significant water loss, one broken sprinkler head, multiple sprinkler heads are not clearing the turf, some leaning sprinkler heads, overspray, poor distribution uniformity

**Table 1 Bellevue High School Water Saving Recommendations**

Proposed Water Saving Measure	Estimated Water Savings (Gals)	Estimated Water Savings (MG)	Estimated Water Savings (MG) (2018 vs 2017)	Estimated Cost (2018 vs 2017)
Repair Leaking Sprinkler Heads	53,000	0.00053	0.00053	0
Repair Leaking Sprinkler Heads	2,500,000	0.025	0.025	0
Repair Leaking Sprinkler Heads	534,000	0.00534	0.00534	0
<b>Total</b>	<b>3,087,000</b>	<b>0.03087</b>	<b>0.03087</b>	<b>0</b>

**Bellevue High School Overview Map**

**L. Historic Water Use**  
**Figure 1 Bellevue High School Irrigation Water Use**  
 Bellevue High School



# Retrofits and upgrades

- Partner with PSE, KCHA, Hopelink, retailers and plumbers
- Rebates for toilets, commercial products (dishwashers, steamers)
- Install rainwater harvesting at schools
- Provide leak detection dye



March 15-21, 2010  
**Fix a Leak Week**  
www.epa.gov/watersense/fixaleak

CELEBRATE  
NATIONAL FIX  
A LEAK WEEK  
WITH BELLEVUE  
AND CASCADE!

How much can you save by fixing leaking toilets and other fixtures? How about 10,000 gallons per year! That's enough to fill these three barrels every week of the year. Get started saving today with these three simple steps:

It's as easy as  
**1 - 2 - 3!**

- 1 Find Leaks**  
Start with your toilets. Use the free leak detection kit to check your toilets for leaks. A leaking toilet can waste thousands of
- 2 Fix Leaks**  
Repairing a leaking toilet is easy to do and inexpensive. Visit
- 3 Save Water**  
Fixing toilets and other leaking fixtures can reduce your water and wastewater

# Cascade's local impact strategy

Education + action = success

2014 – 18 generated savings of ~800,000 gpd

Equivalent to ~2% of 2017 average daily demand (37.1mgd)

Net savings of \$2.6 million

# Limitations of water conservation

- Cost-effectiveness; limited “low-hanging fruit”
- Potential conflicts with revenue
- Potential water quality issues
- Staffing and administrative



# Future opportunities, untapped potential

- Advanced metering infrastructure
- Submetering
- Increased efficiency standards
- Rainwater / greywater use
- Landscape irrigation
- Public education

# Takeaways

Water conservation can...

- Protect quality of life for future generations
- Delay or defer expensive new water sources
- Provide increased in-stream flows
- Reduce greenhouse gas emissions
- Aid in drought mitigation
- Demonstrate stewardship of water resources

# Value of Municipal Water Conservation

## Thank You!

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